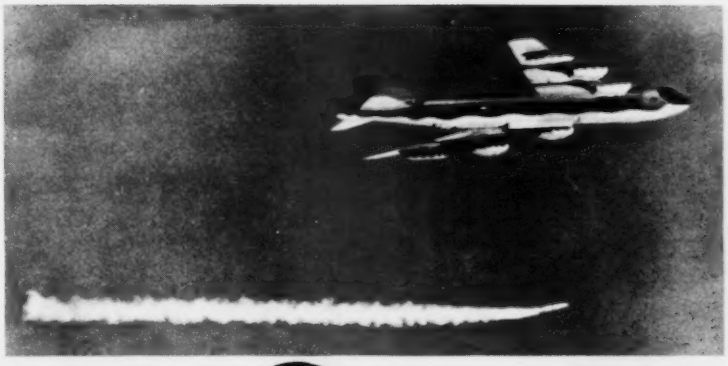
COMMANDERS DIGEST

FY74 DoD PROGRAM —pg. 2

JUNE 7, 1973

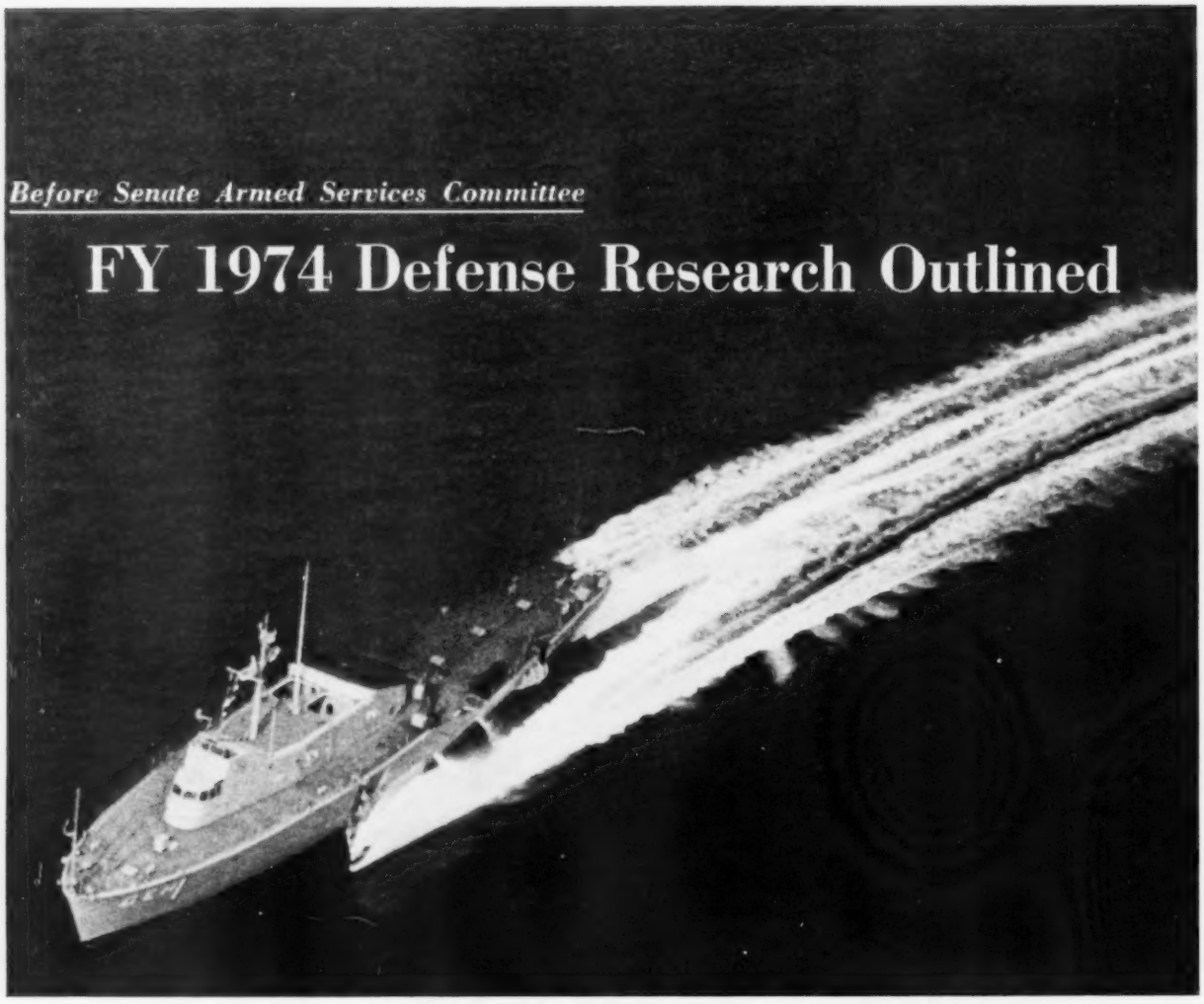


R&D

$8.6 BILLION REQUESTED —pg. 14

Before Senate Armed Services Committee

FY 1974 Defense Research Outlined



SPEED—Foilborne, the hydrofoil research ship USS *Plainview* cuts only a small wake on a trial run.

(U.S. Navy Photo)

On April 17, Dr. John S. Foster Jr., Director of Defense Research and Engineering, discussed the Defense Department's Research, Development, Test and Evaluation (RDT&E) Program for Fiscal Year (FY) 1974 before the Senate Committee on Armed Services. Following are portions of Dr. Foster's testimony, including his summary and his discussion of the DRT&E Budget.

* * * * *

The President is working successfully toward a "generation of peace"—peace based on the strength of our military forces in partnership with our allies. Negotiating from this strength, the President is moving to reduce the threat of war. We must not allow a reduction in the threat of war to lull us into a slackened vigilance and then into a reduction in the military strength which is essential to the continued success of negotiations. We cannot allow our strength to falter without undermining the other elements of the President's security policies —partnership and negotiation.

The military forces we have in the field today are the product of research and development conducted in the 1950s and 1960s. Our current R&D efforts will determine the character and quality of our military forces in the 1980s and, in some cases, to the year 2000. We must be sure that these forces will be adequate to meet our national policy objectives.

The adequacy of our R&D efforts must be measured against the efforts of our leading rival, for our comparative R&D efforts today will determine our comparative standing in weapons quality through the rest of this century. During

A FULL-SCALE MODEL of a Sprint missile sits on a mobile launcher at the White Sands, New Mexico, Missile Range.

(U.S. Army Photo)

the past year, we have continued to study the technological efforts of the Soviet Union and other nations, as well as ours. A number of parallel studies have been refined, and some independent new approaches have been added. There is much uncertainty in each of these avenues of estimating and forecasting, but I find it very disturbing that no projection shows that we are holding our superiority if current trends in the United States and the Soviet Union continue. Each projection independently shows that, to avoid technological inferiority within the next decade, we will have to increase our Defense RDT&E efforts; some of these projections show that substantial increases would be necessary.

When Secretary [Melvin R.] Laird and [Deputy] Secretary [David] Packard reviewed our defense planning several years ago, they recognized the need to increase the real effort being devoted to our research and development. Since there are strong competing demands for our limited defense resources, they had to cut into the level of our forces in the field—to reduce the numbers of planes and ships and tanks in order to budget adequate RDT&E funds. They did this even though it was difficult to gain the support of the Services. R&D is an investment in the future; the Services are vitally concerned that our cutting edge remains keen now and for the near future. It has taken a high order of statesmanship and an understanding of the need for future defense technology for the Services to support the Laird decisions. But during the past three years, the Congress has effectively reduced our RDT&E program request by over $1.5 billion. As a result the Services, in effect, have lost both near-term forces and long-term technology. Their near-term standing forces are smaller, in part because our budget provided for an increased effort in RDT&E; and their future capability is less certain because almost all of this increase was turned down by the Congress. This dilemma has constrained our FY 74 request for RDT&E.

As [then] Secretary Richardson indicated in his annual report, it is our policy, however, to maintain technological superiority in specific areas essential to our military strength. I am delighted with the constructive and detailed interest that both Secretary Richardson and Secretary Clements have shown in reviewing—

- The net assessment of U.S. and Soviet weapons technology,
- Our evaluation of U.S. military research and development,
- Areas in critical need of support,
- The long-term contribution of technology to national security, and
- The ways in which we are trying to do our job better.

We must strive for an understanding between the Congress and the Defense Department regarding the essential objectives of our national security, as well as the resources and talent that are needed to achieve those objectives. I am confident that this review by our new Secretaries will serve to broaden this understanding.

Overall FY 1974 RDT&E Budget

For FY 74, we are requesting $8,617 billion in RDT&E funds, an increase of $598 million over the amount appropriated by the Congress in FY 73. This request is 10.1 percent of the entire proposed DoD budget. Of this increase, almost $300 million will pay the higher costs of doing business—increases in pay and prices.

The table below shows how the proposed budget is allocated between major mission areas and how it compares with this year's activity.

As you can see, when one considers the increased cost of doing business, efforts will actually be increased in only two areas:

- Strategic forces will be increased primarily because of increases for the Trident undersea ballistic-mis-

Mission Areas	(In $ millions) FY 73	FY 74
Strategic systems	1,875	2,183
Tactical warfare	3,018	3,022
Defense-wide systems	507	679
Technology base	1,543	1,620
Management support and test ranges	1,111	1,113
Total	8,054*	8,617

NOTE: * Includes $34.5 million for civilian pay raise.

GROUND TEST—Army infantrymen rush from a Sikorsky mockup of a Utility Tactical Transport Aircraft System (UTTAS). (DoD Photo)

sile system and the Site Defense program. These will more than offset reductions in Safeguard and Minuteman R&D.

- Defense-wide systems will be increased, but this will be partially offset by a three percent manpower reduction in other areas.

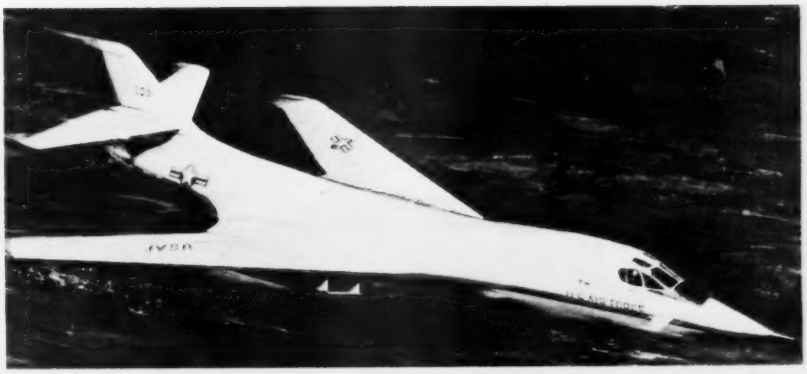
Because our technology base is so critically important in the development of new systems several years from now and in our anticipating what the Soviets may be doing without our knowledge, we must maintain these efforts at least at their current level.

For tactical forces, increased prices and pay mean that the FY 74 budget we are proposing will actually represent a slight reduction of effort. As a result, new and expanding programs will be financed by funds available from developments nearing completion, particularly the F-14, F-15 and S-3A. In the tactical area, some of the major programs that are increasing are the A-10 close-support aircraft (formerly known as the A-X), the UTTAS helicopter, the surface-effect ship, the advanced medium STOL transport, the main battle tank, SAM-D, the heavy-lift helicopter, and Agile.

Mission Areas

Strategic Forces: We all hope that the ABM Treaty and the Interim Offensive Agreement concluded in SALT will go down in history as major achievements in limiting strategic arms and lessening the prospect of nuclear war. The Treaty has led to immediate savings from the reduction of effort on the Safeguard Anti-Ballistic Missile (ABM) system and on plans for deploying it. These savings have been reflected both in the 1973 and 1974 Defense programs and in our projections for the out years.

The Treaty and the Agreement, how-



UNDER STUDY—The B-1 bomber (artist's concept, top right) will be better able to penetrate enemy air defenses than the current B-52 (bottom photo).

(U.S. Air Force Photos)

ever, allow qualitative improvements and the development of new strategic forces —except for some ABM approaches such as those calling for rapid reloading or basing on other than fixed installations.

For this reason, it is not surprising that the June 22, 1972 issue of *Pravda* could clearly state as Soviet policy: Until the danger of nuclear war "is liquidated, the Soviet Union has taken and will take all necessary measures to guarantee its security and the security of its allies."

A few days later at a White House briefing, the President told a congressional group that "Mr. Brezhnev and his colleagues made it absolutely clear that they are going forward with defense programs in the offensive area which are not limited by these agreements." We also intend to maintain vigorous efforts, for to do otherwise might tend to upset the new relationships we have achieved with the Soviet Union.

We have three major objectives in research and development for our strategic forces. In essence, each of these is intended to assure the survival and penetration of our strategic forces, whether the SAL agreements are continued, or enlarged, or reduced:

- We must be prepared to deploy strategic forces permitted under the current SAL Agreement that we might need as the Soviets upgrade their offenses or defenses. Developments supporting this objective include the B-1, SCAD, Trident, and the submarine-launched cruise missile (SLCM).
- We must maintain a posture with respect to deployed and developing forces that will allow us to negotiate successfully for more extensive agreements—and to bargain from a position of strength. The four strategic systems I just mentioned can also do this.
- We must maintain a timely and credible hedge against the abrogation of the SAL Treaty or Interim Agreement and against failure to conclude a final agreement on offensive weapons. For this reason, Site Defense is essential as a future potential defender of our Minuteman missiles.

We therefore urge your continued support of these developments:

- We need to develop the B-1 because it will be less vulnerable to attack on the ground by submarine-launched missiles and because it will be better able to penetrate air defenses than the current B-52.
- We need to develop the Trident missile and submarine because they will

COMMANDERS DIGEST

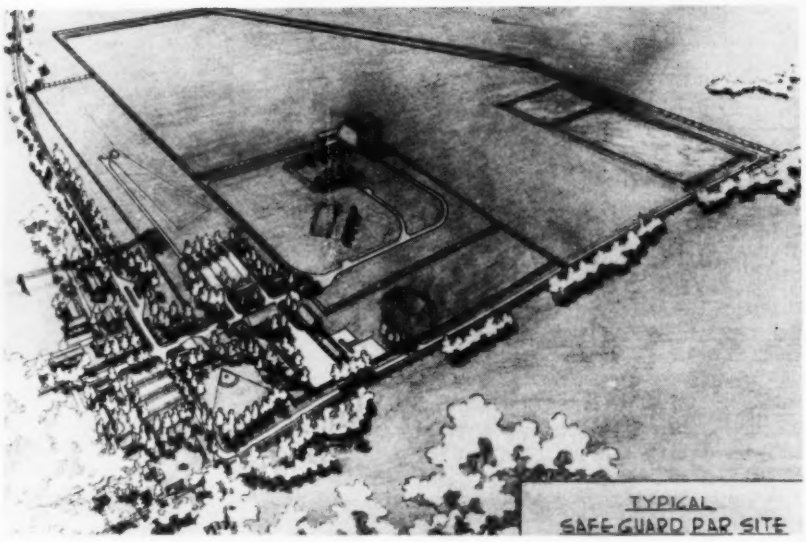
Vol. 13, No. 31; June 7, 1973

A publication of the Department of Defense to provide official and professional information to commanders and key personnel on matters related to Defense policies, programs and interests, and to create better understanding and teamwork within the Department of Defense.

Published weekly by the American Forces Press Service, 1117 N. 19th St., Arlington, Va. 22209, a unified activity of the Office of Information for the Armed Forces, OASD (M&RA). Reproduction of content is authorized.

Telephone: (202) OXford 4-4912
Autovon 224-4912

Cover Photos: U.S. Navy (top left); U.S. Air Force (top right); U.S. Army (bottom).



AFFECTED BY TREATY—Anti-Ballistic Missile (ABM) Treaty has led to immediate savings from the reduction of effort on the Safeguard ABM system and on plans for deploying it.
(DoD Illustration)

reduce the threat of antisubmarine warfare by enabling operation over larger patrol areas and by reducing the submarine's noise level; because they will eventually replace an aging fleet with submarines that can spend more time productively at sea; because they will lessen our dependence on overseas bases.

- We need to develop the Site Defense system because it will be much more efficient than Safeguard and more capable of defending Minuteman and because it will be the focus of ABM systems engineering.

In addition, we are planning to initiate the development of a submarine-launched cruise missile, which will present to the Soviet defenses a new kind of penetrator—one consisting of more and smaller targets launched from undersea bases and arriving at very low altitudes.

Tactical Forces: Our future tactical forces must be prepared to fight against many kinds of threat, at differing levels of conflict, in many diverse locations. Most critical and challenging is the necessity to prepare for a potential conventional war in Central Europe, where we would face the enormous power of the Warsaw Pact's armored forces and artillery, where our air superiority would be threatened by thousands of tactical aircraft, and where the resupply of forces in Europe from the United States would depend on naval protection of shipping lanes against a growing and spreading Soviet navy. We must also be prepared to wage conventional war in many places other than Europe; to support our allies in guerrilla operations in various climates.

We must pursue these objectives with force levels that have been reduced owing to rising manpower costs and the transition to an All-Volunteer Force. It is especially important, therefore, that we make our numerically smaller forces count for more. We can only do this by providing them with equipment that will make each fighting unit more effective.

The role of technology in continually changing the nature of strategic forces is generally appreciated—in fact, it is founded on the emergence of nuclear weapons. During the last 10 years, however, technology has produced a number of revolutionary devices that also enormously increase the striking power of our tactical forces. We can acquire targets by day or night, and often we can hit them directly by means of terminal homing weapons guided by laser beams or remotely piloted. Similar challenges remain to be faced if we are to gain the ability to locate and destroy artillery and mortars, to protect our troops against land mines, to bomb precisely in bad weather, to defend our ships against a growing family of missiles, and to counter parallel—or entirely unexpected—developments in the tactical forces of potential adversaries.

For this reason, RDT&E for tactical forces is the largest element of our proposed FY 74 budget, almost 40 percent of it.

Our FY 74 R&D program to support land combat forces is aimed primarily at improving our capability to operate against modern mechanized and armored forces and to protect our own from air attack. We need significant improvements in five aspects of land combat:

- More reliable detection and more accurate location of hostile mechanized forces and artillery and more effective coupling of this information with weapon-delivery systems are essential. Major programs to fill these needs include countermortar and counterbattery radars, remotely piloted surveillance vehicles, the remotely monitored battlefield-area sensor system (REMBASS), thermal imaging sensors, the automated tactical fire-direction system (TACFIRE), and the TRI-TAC communication system.
- Recent and planned developments to improve firepower effectiveness with decisively superior weapon systems—particularly against armored targets—include the A-10, a close-support aircraft; an advanced attack helicopter; the XM1 tank; the laser-guided Maverick; Hellfire; guided artillery projectiles, and the antitank missiles TOW and Dragon.
- For combat vehicles, the greater mobility of the XM1 tank, the mechanized infantry combat vehicle (MICV), and the armored reconnaissance scout vehicle (ARSV) means that these systems will have increased survivability and will be able to perform more missions of greater diversity.
- Our forces, airfields and other highly valuable assets must be protected against low-level saturation air attacks and the medium-bomber threat. SAM-D will be capable of all-weather operation and simultaneous engagement of multiple targets in the presence of advanced electronic countermeasures. The man-

AIR SUPERIORITY—To support tactical air forces, research and development is being directed toward improving air to air weaponry on F-14 (top photo) and F-15 (bottom artist's concept) aircraft.

(U.S. Air Force Photos)

portable Stinger will be invaluable for use in the self-defense of our forward forces against aircraft, and will also contribute to the en-route attrition of enemy aircraft.

- For overall combat effectiveness, assault troops and their tactical and combat-support equipment must be rapidly and efficiently moved. To that end, we have major programs to develop the utility tactical transport aircraft system (UTTAS), the heavy-lift helicopter (HLH), and the advanced medium STOL transport (AMST).

To support our tactical air forces, we are conducting R&D directed toward the following improvements:

- Providing an airborne system that can "look down," detect low-altitude intruders, and direct interception by our own aircraft. An example of this is the development of the E-3A AWACS (airborne warning and control system), which removes many of the limitations of ground-based radar systems.
- Modernizing and improving fighter and air-to-air weaponry that we need for air superiority. Examples are the F-15 and F-14 aircraft developments and the AIM-7 and AIM-9 missile modification programs.
- Improving our ability to perform reconnaissance and to attack ground targets at night throughout the battle area. Programs include infrared systems for the A-6 and A-7 aircraft.
- Protecting aircraft by means of both active and passive techniques of defense suppression and electronic warfare. Examples are the high-speed antiradiation missile (HARM) and the TOA/DME (time-of-arrival/distance-measuring equipment) system—both for use against radars —and the EF-111A aircraft jamming system.

We are directing R&D in support of tactical Naval forces primarily as follows:

- Improving surveillance of both surface and subsurface threats. In undersea surveillance, improvements to fixed passive systems (SOSUS), plus the development of mobile deployable systems such as the moored surveillance system (MSS) and towed arrays, can provide the needed capability. For surface surveillance, satellites plus EP-X aircraft will furnish the tactical localization data.
- Improving Naval communications with the development of the Fleet SATCOM (satellite communications) system.
- Improving our offensive capability against enemy ships by means of the Harpoon, Condor and active Standard missile developments.
- Improving our defenses against coordinated antiship-missile attacks

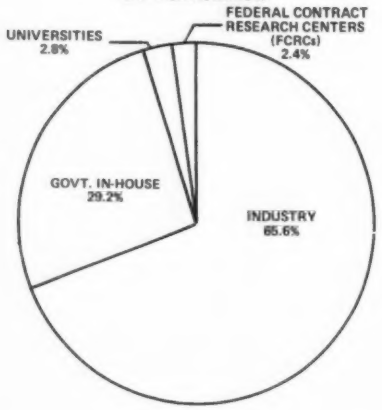
(Continued on Page Ten)

RDT&E PROGRAM ELEMENT INCREASES OF $25 MILLION OR MORE, FY 1974 OVER FY 1973
($ millions)

Title of Program Element	FY 1973 ($)	FY 1974 ($)	Increase ($)
Army			
Site Defense	80.1	170.1	90.0
UTTAS	50.4	108.9	58.5
Advanced Attack Helo	20.1	49.3	29.2
Navy			
Surface Effects Ship	32.0	72.8	40.8
Trident Missile Systems Engineering	349.1	531.7	182.6
Antiship Weaponry	—	66.6	66.6
Air Force			
AMST Prototype	25.0	67.2	42.2
B-1 Aircraft	444.5	473.5	29.0
A-X Aircraft	48.1	112.4	64.3
Special Activities	188.4	299.4	111.0

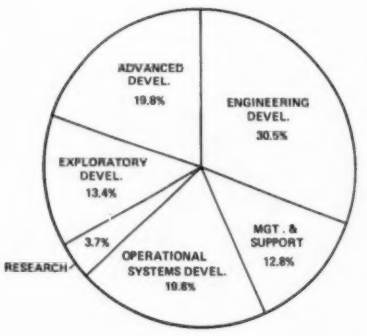
FY 1974 DOD RDT&E
PRESIDENT'S BUDGET

BY PERFORMER



	(MILLIONS)
INDUSTRY	$5,651.1
GOVT. IN-HOUSE	2,520.9
FEDERAL CONTRACT RESEARCH CENTERS (FCRCs)	209.9
UNIVERSITIES	234.7
EMERGENCY FUND	
TOTAL	$8,616.6

BY CATEGORY



	(MILLIONS)
RESEARCH	$ 320.2
EXPLORATORY DEVELOPMENT	1,152.9
ADVANCED DEVELOPMENT	1,708.5
ENGINEERING DEVELOPMENT	2,627.7
MANAGEMENT & SUPPORT	1,099.0
OPERATIONAL SYSTEMS DEVELOPMENT	1,708.3
EMERGENCY FUND	-
TOTAL	$8,616.6

SUMMARY OF DOD R
THE PRESIDE
(I

Item	FY
Research	
Exploratory Development	1,
Advanced Development	1,
Engineering Development	1,
Management and Support	1,
Operational Systems Development	2,
Emergency Fund	
Total	7,
Army	1,
Navy	2,
Air Force	2,
Defense Agencies	
Emergency Fund	
Total	7,
Industry	4,
Government in-house	2,
FCRCs	
Universities	
Emergency Fund	
Total	7,
Military Sciences	
Aircraft & Related Equipment	1,
Missiles & Related Equipment	1,
Astronautics & Related Equipment	
Ships & Small Craft	
Ordnance, Combat Vehicles & Related Equipment	
Other Equipment	1,
Management and Support	
Emergency Fund	
Total	7,
Tactical Warfare	2,
Strategic Systems	1,
Defense-wide Systems	
Basic Technology	1,
Management and Support	1,
Advanced Technical Development	
Total	7,

NOTES: * Includes $34.5 million for the ci
** Includes $61.3 million for the ci

RDT&E LISTINGS SUPPORTING ENT'S FY 1974 BUDGET

(In $ millions)

Y 1972	%	FY 1973	%	FY 1974	%
		A. By Category			
329.6	4.3	315.3	3.9	320.2	3.7
,099.7	14.5	1,103.3	13.7	1,152.9	13.4
,265.8	16.7	1,342.2	16.6	1,708.5	19.8
,575.8	20.8	2,158.2	26.9	2,627.7	30.5
,044.5	13.8	1,096.5	13.6	1,099.0	12.8
,269.1	29.9	2,038.4	25.3	1,708.3	19.8
—	—	—	—	—	—
,584.5	100.0	8,053.9*	100.0	8,616.6**	100.0
		B. By DoD Component			
,791.6	23.6	1,896.8	23.5	2,128.8	24.7
,411.1	31.8	2,552.0	31.7	2,731.2	31.7
,928.4	38.6	3,130.3	38.9	3,228.7	37.5
453.4	6.0	474.8	5.9	527.9	6.1
—	—	—	—	—	—
,584.5	100.0	8,053.9*	100.0	8,616.6**	100.0
		C. By Performer			
,887.1	64.4	5,278.6	65.5	5,651.1	65.6
,273.3	30.0	2,375.9	29.5	2,520.9	29.2
204.3	2.7	183.4	2.3	209.9	2.4
219.8	2.9	216.0	2.7	234.7	2.8
—	—	—	—	—	—
,584.5	100.0	8,053.9*	100.0	8,616.6**	100.0
		D. By Budget Activity			
532.1	7.0	509.2	6.3	525.2	6.1
,969.4	26.0	1,839.2	22.8	1,785.3	20.7
,801.1	23.8	2,102.1	26.1	2,265.1	26.3
388.8	5.1	407.8	5.1	602.6	7.0
493.7	6.5	584.4	7.3	622.2	7.2
362.6	4.8	351.8	4.4	418.2	4.9
,466.1	19.3	1,620.6	20.1	1,747.5	20.2
570.7	7.5	638.8	7.9	650.5	7.6
—	—	—	—	—	—
,584.5	100.0	8,053.9*	100.0	8,616.6**	100.0
		E. By Mission			
,926.0	38.6	3,017.6	37.4	3,022.0	35.1
,402.3	18.5	1,875.6	23.3	2,182.9	25.3
495.3	6.5	507.1	6.3	678.9	7.9
,429.3	18.8	1,418.6	17.6	1,473.1	17.1
,082.2	14.3	1,110.7	13.8	1,113.2	12.9
249.4	3.3	124.3	1.6	146.5	1.7
,584.5	100.0	8,053.9*	100.0	8,616.6**	100.0

vilian pay raise of January 1973.
vilian pay raise of January 1973.

RDT&E PROGRAM ELEMENT DECREASES OF $25 MILLION OR MORE, FY 1974 UNDER FY 1973

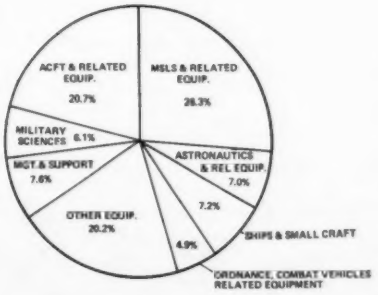
($ millions)

P.O. No.	Title of Program Element	FY 1973 ($)	FY 1974 ($)	Decrease ($)
	Army			
12514A	Safeguard	299.7	216.5	83.2
	Navy			
64363N	Aegis Engineering	78.5	43.2	35.3
24234N	S-3 Squadrons	38.8	5.2	33.6
25666N	F-14B	104.6	17.0	87.6
	Air Force			
11213F	Minuteman	139.7	99.8	39.9
27130F	F-15A	454.5	229.5	225.0

FY 1974 DOD RDT&E

PRESIDENT'S BUDGET

BY BUDGET ACTIVITY



	(MILLIONS)
MILITARY SCIENCES	$ 525.2
AIRCRAFT & RELATED EQUIPMENT	1,785.3
MISSILES & RELATED EQUIPMENT	2,265.1
ASTRONAUTICS & RELATED EQUIPMENT	602.6
SHIPS & SMALL CRAFT	622.2
ORDNANCE, COMBAT VEHICLES & RELATED EQUIPMENT	418.2
OTHER EQUIPMENT	1,747.5
MANAGEMENT & SUPPORT	650.5
EMERGENCY FUND	
TOTAL	$8,616.6

BY MISSION

	(MILLIONS)
TACTICAL WARFARE	$3,022.0
STRATEGIC SYSTEMS	2,182.9
DEFENSE-WIDE SYSTEMS	678.9
BASIC TECHNOLOGY	1,473.1
MANAGEMENT & SUPPORT	1,113.2
ADVANCED TECHNICAL DEVELOPMENT	146.5
TOTAL	$8,616.6

(Continued from Page Seven)

from enemy air, surface and submarine forces. Aegis, the F-14 and the E-2C will improve our long-range area defenses. The dual-mode Redeye, the Phalanx close-in weapon system, the automated threat-detection and target-designation system, the NATO Seasparrow, and low-cost electronic warfare systems will improve our defense of individual ships.

- Improving systems for the protection of our merchant shipping and Naval forces from submarine attack. Of particular concern is the standoff range afforded by the submarine-launched cruise missile. The sea control ship, the patrol frigate, and air ASW can provide defense in depth for these forces.

Technology Base

Research, exploratory development, and portions of our advanced development RDT&E budget comprise our technology base—the exploration of science and engineering to find applications of military worth. Specifically, this technology base is needed—

- To open up new avenues of technology that make possible significant improvements in current weapon systems or even entirely new kinds of systems;
- To reduce the cost of current military equipment;
- To help make effective use of military personnel; and
- To avoid being technologically surprised by activities of potential adversaries who can deny us much information on weapons they are developing.

The technology-base effort is made up of many relatively small projects covering many different areas of science and engineering. This diversity poses management problems:

- How can we be sure these projects are addressing important military problems?
- How can we be sure that a project at one laboratory is not needlessly duplicating some project at another laboratory?
- How can we be sure that results of this R&D effort are eventually applied to needed military systems?

Last year, I indicated that we had instituted new management techniques for addressing these questions. These techniques have now been applied to virtually the entirely technology base, and I am pleased to report that this intensive "scrubbing" has led to a more effective program—one that is integrated throughout the three Services.

We are supporting such promising developments as high-energy lasers, higher strength materials, engine technology and cost-reduction programs, and improved electronic devices.

As noted earlier, we view this part of the Defense RDT&E program as necessary to avoid becoming victims of technological surprise. Because other national societies are less open than our own, the intelligence we acquire on other countries' technological capabilities and intentions is often delayed. One of the ways we compensate for this time lag is by conducting a vigorous technological program which, by showing us what is—or is not—realistically attainable, enables us to interpret fragmentary intelligence with greater accuracy and insight.

A study of our knowledge of Soviet programs, which we just completed this year, forcibly illustrates the importance of this function of our exploratory development.

Interdependence with our Allies

Under the Nixon Doctrine, we and our allies are making progress toward the more efficient use of our technological resources. In the tactical area, our allies' collective R&D activity is about the same as ours, but over $1 billion is prob-

Artist's concept of a new patrol frigate

HEAVYWEIGHT—To help move combat-support equipment, a heavy-lift helicopter is being developed for land forces.
(U.S. Army Photo)

ably duplicative work. We have taken steps that should lead to reducing this duplication:

- The attention of NATO has been focused on this matter, with the result that there is an agreement on principles for avoiding duplication.
- Information on key requirements, capabilities and decision dates relating to national developments is being exchanged on a regular basis with our NATO allies.
- The United States has evaluated the United Kingdom's Rapier, the Federal Republic of Germany's Roland, and the French Crotale in the hope that an important U.S. need may be satisfied by one of these products of European R&D.
- The United States, the United Kingdoms, France and the Federal Republic of Germany are to test existing antitank weapons as a basis for development of future systems.
- The United States is working jointly with Italy and the Federal Republic of Germany on the NATO Hydrofoil Program.
- We have offered to make available to NATO our technology on electronic countermeasures, laser-guided weapons, Lance, and remote sensors.

U.S. policy is that, generally, any hardware developed by one of our allies that is selected for U.S. forces will be produced in this country under license. Thus, we will provide employment for U.S. workers and will establish a production base here. Moreover, the limited U.S. R&D funds that might have been applied to developing an American counterpart of the foreign equipment will be freed to support other advanced U.S. projects.

R&D Management

In recent years, the Congress and others were justifiably critical of management in the acquisition of our major programs. To emphasize this dissatisfaction, to curb programs that seemed to be inordinately expensive or were suffering from other difficulties, the Congress has often cut Defense RDT&E funding much deeper than could be justified by identification with specific programs. As a result, one of our major concerns has been to establish policies and procedures that would, if implemented, correct many of these deficiencies.

The new policies provide for less concurrency of development and production to reduce risk, the use of prototypes to prove out new ideas and improve cost estimates, the establishment of milestones with test and evaluation goals for each phase, and the streamlining of project management to insure accountability and prompt decisions.

In order to enforce these policies, we have established related procedures. Each major program is to have a Development Concept Paper which defines the essential objectives and milestones agreed upon. As each milestone approaches, the Defense Systems Acquisition Review Council (DSARC) meets to see whether the policies are being followed and the milestone has been achieved. The DSARC illuminates program issues and sets forth a plan for their resolution.

The difference between enunciating procedures and policies and actually getting them implemented [can be well understood]. Consequently, in the 30 DSARC and Formal Management Reviews of the past year, we have given close attention to the matter of whether these policies are being followed and whether they are working. We conclude that, for the most part, they are working well. Some weapon-system programs, of course, still have management trouble. Nonetheless, I think this fraction is now becoming as small as one can hope to achieve in an area as complex and technical as the development and procurement of major weapon systems.

. . . I believe it is very important that the Committee address this problem to see whether or not you conclude that our management has been much improved. If your impressions are favorable, I trust [the Committee] will help us convince the Congress that management weaknesses in the Department of Defense no longer justify reductions in our RDT&E budget.

Another DoD theme in the past year has been an attempt to reduce the total life-cycle cost of all future weapon systems and components, large and small. A number of interrelated approaches are being used:

- The development of simpler, lower cost systems that can be procured in large quantities and will complement the more sophisticated systems that we buy in smaller numbers.
- The use of standardized modular components in a number of different weapon systems in order to cut development costs and benefit by the "learning-curve" reduction in unit cost and improvement in reliability.
- The establishment of joint Service programs to produce single end items for multi-Service use.
- The modification of existing systems to allow their use in roles other than those originally planned.
- The exploration of inherently lower cost technology.

Central to all of these approaches is the widely increasing application of "design-to-price" practices in acquiring systems and components. In the design-to-price concept, a target unit production price for the system is established early in the development cycle. After that, achieving this target price is a major objective in the program; we are prepared to extend the development and to sacrifice performance to hold down subsequent production costs. We are also prepared to adjust the target price, if its achievement proves impractical. The use of this approach for the A-X aircraft has been well publicized. We are now insisting that the design-to-price approach be used for almost all new developments. I want to emphasize that designing to price is not incompatible with achieving high technical quality in weapon systems. The civil electronics and computer market testifies to the validity of this observation. What we are trying to do is make sure that development efforts concentrate equally on the factors of performance and cost. The highest technical quality is realized when engineering ingenuity produces the needed capabilities at an affordable price.

Test and Evaluation

The year 1972 was the first one in which our Test and Evaluation (T&E) office has been fully manned and operational. . . . A strong staff has been formed, headed by a Deputy Director of Defense Research and Engineering who reports directly to the Deputy Secretary of Defense on important T&E matters. At each decision point of every major program, he advises the DSARC whether the testing plans are adequate and whether the testing accomplished justifies moving on to the next phase in the cycle. The second major T&E function is to arrange for joint testing.

This concern for appropriate T&E has now become an essential but routine part of our program review. Of the 70 higher-cost programs, the 46 that were in early or middle stages of development have been reviewed in detail by the Deputy Director (T&E), and are now scheduled for more intensive preproduction development and operational test and evaluation. In some cases, major procurement is being delayed to allow time for this testing—for example, the B-1, the Captor mine, and the Vulcan/Phalanx close-in weapon system.

During the past year, joint testing was reinstituted on a broad, aggressive basis. In June, we successfully completed the joint two-sided operational test and evaluation of the Maverick air-to-ground missile system in an engagement with a tank company reinforced by mobile anti-aircraft. In FY 73, we initiated three other joint two-sided tests concerned with electronic warfare, the effectiveness of close air support, and countermeasures to laser-guided weapons. We are also taking steps to improve our operational T&E base through five multi-Service operational test activities—defense suppression, airborne target acquisition, air-to-air effectiveness, radar bombing accuracy, and aircraft survivability. For FY 74, we propose to initiate joint test programs to evaluate tactical command and control in close air support and to measure the operational effectiveness of laser-guided weapons.

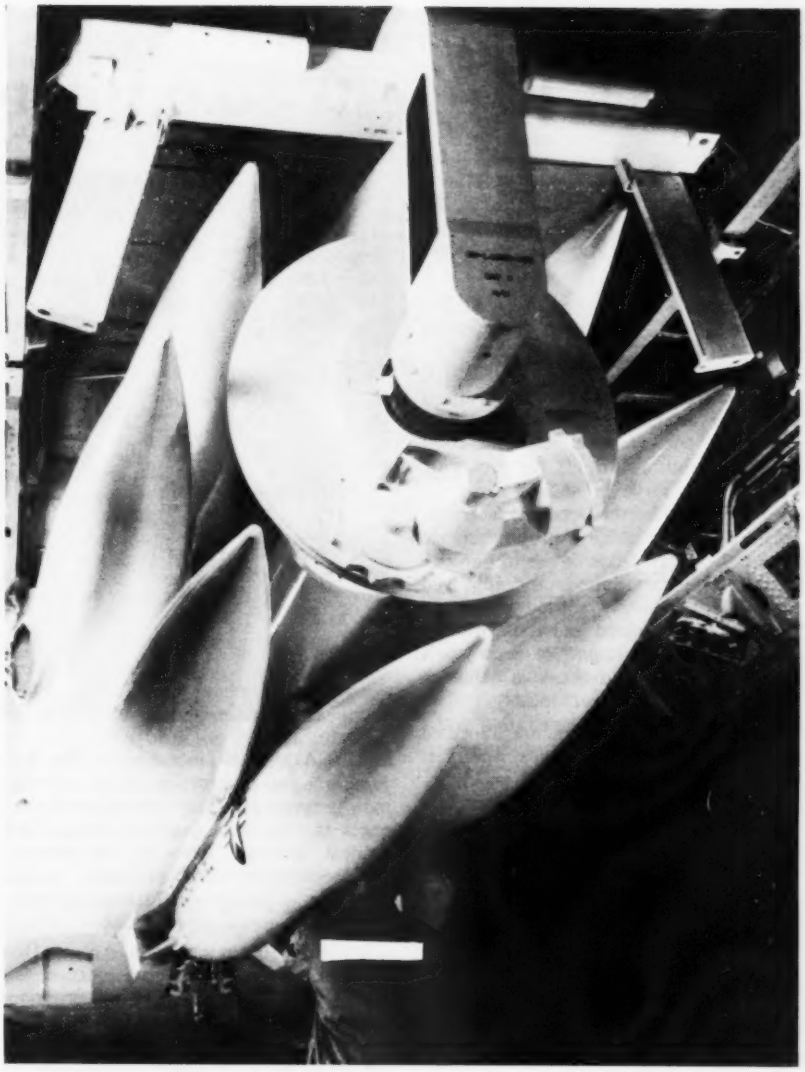
Progress and Successes

During the past year we have made marked progress in many areas. In our strategic forces:

- A tactical warning satellite was launched into stationary orbit to provide early warning of attack by submarine-launched ballistic missiles (SLBMs).
- Surplus components from the undeployed part of Safeguard are being diverted for possible use in providing radars for SLBM warning.
- The Trident submarine, our sea-based deterrent for the 1980s, has been approved for detailed design.
- Propulsion tests and design progress for the Trident missile have given us high confidence that the range can be achieved within the system's packaging, weight and cost constraints.
- The B-1 program is on schedule; final assembly of the first R&D aircraft is nearly finished; and full-scale engine tests have been successfully completed.
- The short-range attack missile (SRAM) achieved operational capability with the B-52 and the F-111.
- Minuteman III and Poseidon were deployed on schedule.
- Safeguard deployment at Grand Forks, North Dakota, is proceeding on schedule; test results through February 2, 1973 are: 34 successful, 2 partially successful, and 4 unsuccessful.

For our tactical forces:

- One of two competitive prototypes of the Compass Cope, a high-altitude, long-endurance remotely piloted vehicle (RPV) was finished in January 1973.
- Remote, unattended ground sensors to detect tactical ground targets such as personnel and vehicles have been successfully demonstrated.
- Array improvements for undersea surveillance to cope with quiet targets have been started. These include the suspended-array sub-system for the current fixed acoustic surveillance system (SOSUS).
- A series of evaluation flight test in the EP-X program has demonstrated the value of an airborne sensor system for improving the extent and timeliness of tactical surveillance information transmitted to fleet commanders.
- A major advance in surveillance from aircraft was realized when the Air Force's E-3A AWACS successfully demonstrated in flight, on a "brassboard" radar, its ability to detect and track low-flying aircraft targets at great distances over land.
- The A-X prototype fly-off competition was successfully completed in December 1972. An evaluation of the technical approach, cost pro-



SRAM missiles are being developed to fit in weapons bays of B-52G and H model and FB-111 bombers.

(Boeing Photo)

posals based on design-to-price criteria, and results of the flight evaluation led to the selection of the Fairchild A-10.

- The Air Force's F-15 first flew on 26 July 1972. Since then, flight testing has proceeded satisfactorily and ahead of schedule, but we are experiencing difficulties in qualifying the engine, being delayed by failures in the fan and turbine components.
- The Navy's F-14 Phoenix system succeeded in destroying four out of four targets simultaneously. Grumman has begun delivery of F-14 aircraft to the Navy.
- The F-5E international fighter aircraft made its first flight ahead of schedule in August 1972. Problems with the production engine's blade design caused the suspension of flight testing in September 1972, but corrections were made, and the flight tests resumed on 16 December.
- The Navy's S-3A aircraft, with a complete suite of sensors and electronics, demonstrated specified performance against submarine targets.
- The TOA/DME system has demonstrated the ability to locate radars and to guide weapons launched from F-4 aircraft to the target radar.
- In December 1972, the first Harpoon guidance test vehicle was air launched and successfully guided to the target. This system offers great promise of revolutionizing our Navy's offensive capability.
- The versatile avionics shop tester (VAST) completed initial demonstration tests in the *USS Kitty Hawk*. As it more quickly and reliably performs functions now accomplished by several different test equipments, VAST will increase the availability of tactical aircraft and will relieve congestion in maintenance areas.

In the area of technology:

- Combined control of thrust magnitude and direction has been demonstrated in solid rockets for tactical surface-launched missiles. This advance could increase several fold the target-intercept capability of future long-range surface-to-air missiles and reduce their cost significantly.
- A new solid-propellant fuel has more energy per pound and better storage capability and is less expensive to load than current propellants. Applied to SAM-D, for example, it is expected to reduce propellant costs by about 20 percent.

RDT&E and National Security

I believe that the Military Departments have made and are making great progress in managing and developing new technology and new military capabilities. But I would be derelict in my responsibility if I did not indicate . . . my overriding concern: I believe that in the long run our national security will be in jeopardy unless we find, in the next year or two, some way to sustain, significantly increase, and improve the resources dedicated to research and development for our military forces. We need a revitalized and stronger effort—an effort that will attract the undivided attention and sustained contribution of the best people available in the United States.

Reduced Manpower, Increased Costs

RDT&E Requests $8.6 Billion for FY 1974

The total Research, Development, Test and Evaluation (RDT&E) budget request for FY 74 is $8,616.6 million, as compared to $8,019.5 million appropriated in FY 73.

Our proposed RDT&E program has been balanced as a result of an intensive review of both internal and external factors. External influences on the RDT&E program are considerations of reduced manpower levels, the increasing cost of operations and maintenance, and competing demands for funds for procuring equipment to serve immediate force deficiencies. Within the RDT&E account, we have tried to strike a proper balance among the fiscal needs of the technology base, ongoing and previously approved programs, and newly started programs. We further recognized and took into account the out-year impact of each year's budget decisions, and thus we achieved a balanced program over time.

Although RDT&E funds are allocated to the Military Departments and Defense Agencies to promulgate and manage the approved programs, the Secretary of Defense's budget decisions are based on the recognition of operational deficiencies and needs and are not arbitrarily apportioned among the various DoD components. Thus, we will describe the budget request in terms of mission areas, deficiencies and needs, and the programs that are designed to resolve the deficiencies. Detailed funding breakouts are presented in the tables and charts on pages 8 and 9.

Funding Changes by Mission Area

Following are significant changes, by mission area, between the FY 74 request and the FY 73 appropriation.

Strategic Offense

There has been a modest net increase in our RDT&E requirements for strategic weapons, despite the Strategic Arms Limitation (SAL) agreements with the Soviet Union in 1972. The subject was discussed with the Congress at some length during FY 73 deliberations. Significant increases in two vital programs, Trident and SCAD, small increases in the B-1 program, and a reduction in the Minuteman program constitute the major differences in this area since last year. The Trident program, now in engineering development, consists of longer range missiles and an advanced submarine platform; the increase here is $186.4 million.

COMPETITOR—The Northrup A-9 jet vied in an A-X prototype fly-off competition, completed in December 1972.

(U.S. Air Force Photo)

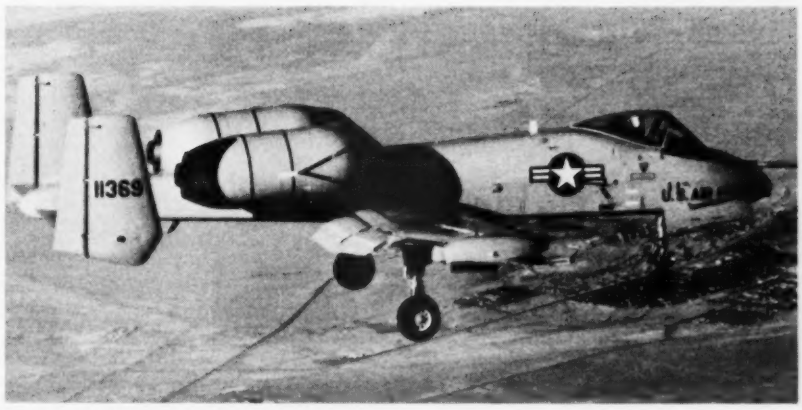
For the Subsonic Cruise Armed Decoy (SCAD) program, an increase of $23.6 million is planned as the program enters its second year of full-scale development. The decoy, with its potential in an armed version, is necessary to improve the viability of the strategic-bomber portion of the Triad (strategic aircraft, land-based missiles, sea-based missiles).

The B-1 program increases by $29 million as planned while it continues through full engineering development. The Minuteman program, however, decreases by $39.9 million as development efforts toward improvement and modernization are being concluded.

Strategic Defense

In the U.S. Ballistic Missile Defense program, which provides the technology base on which our strategic ABM defense program relies, there have been changes in funding level for FY 74 as a result of the Strategic Arms Limitation Agreement. Owing to the decision not to deploy Safeguard at the National Command Authority, the other ABM site allowed under the treaty, the Safeguard RDT&E program has been reduced by $83.2 million. The Site Defense program is receiving increased funding, from $80 million in FY 73 to $170 million in FY 74. Mr. Laird stated to the Congress that it is essential that this program proceed rapidly to provide an adequate hedge for the SAL agreement in the event a threat to Minuteman were to develop. In accordance with this thought, the Advanced Ballistic Missile Defense technology program is increased from last year's budget by $11.6 million to restore that program to the level of $100 million a year on a continuing basis.

We are requesting monies in the



EVALUATION following an A-X fly-off competition in December 1972 led to the selection of the Fairchild A-10.

(U.S. Air Force Photo)

amount of $24.5 million for our advanced surveillance technology efforts so as to provide experimental measurements that are essential to determining the feasibility of new optical sensors for our defense programs. In addition, we are enhancing our research aimed at improving our early warning satellites' ability to observe missile launches.

We continue to place high priority on improving our capability to detect ICBMs, FOBS (fractional-orbit bombardment system) vehicles, and SLBMs (submarine-launched ballistic missiles) that might be launched against the United States or its allies. We need this capability to protect our bombers, to alert decisionmakers, and to provide the national authorities the information they require to determine our response. We have asked for increased funds of $27.2 million for programs to improve the credibility, reliability and speed of our current warning and assessment network. We will upgrade the radar net that warns of SLBM attacks on the United States by deploying two phased-array radars to increase detection range, predict the impact point of incoming missiles, and back up our warning satellites. Moreover, we are making changes to speed the reporting and correction of data to command centers so that patterns of attack can be discerned and displayed to the national authorities.

Tactical Air Warfare

In order to more closely pace the Soviet Union's fighter programs, we instituted a comprehensive fighter-development program in the late 1960s. Those programs, F-14A/B, F-15 and F-5E, are now past their peak RDT&E funding years. The FY 74 budget shows a significant reduction of $345.3 million in RDT&E monies for them. Our intention to continue advanced fighter-development programs to achieve a balanced capability is evidenced by the Lightweight Fighter (LWF) prototype program, which is up $6.5 million in FY 74 but will not proceed at the accelerated funding pace of recent years.

We are requesting $15 million more to repackage 10 EA-6B/ALQ-99 pod-mounted, electronic-warfare jammer transmitters on a pallet for installation in the EF-111A. The EA-6B's automatic computer-controlled receiver system will be used to control the jammers. This program will support the development, test and evaluation of two prototype EF-111A support jammer aircraft as replacements for the obsolete EB-66, which is now being phased out of operation. A comprehensive operational test and evaluation of the system is planned to determine the total system's capabilities for self-protection and mutual-support jamming. FY 73 funds are being used for system design and the identification of high-risk areas. FY 74 funding will support the development and procurement of hardware for pallet-installed equipment and related items.

Tactical Combat Support

Development costs are increased by $207 million in this area. The substantial part, $143 million, is in four air-mobility programs: The Advanced Medium STOL Transport (AMST), up $42.2 million, and the Utility Tactical Transport Aircraft System (UTTAS), up $58.5 million, are being developed competitively; the Heavy-Lift Helicopter and the CH-53E, which are being developed to support the basic concept of tactical mobility and free us from congested surface road networks and port complexes, account for a $41.9-million increase.

Land Warfare and Supporting Firepower

We are requesting in the FY 74 budget an increase over FY 73 of $175.1 million for six programs in land warfare. Our air defense systems are receiving close attention: The SAM-D program, for which an increase of $22.9 million is requested in FY 74, is in the second year of engineering development, the peak funding year of the entire R&D program. In addition, a competitive evaluation of foreign Low-Altitude Forward-Area Air Defense System (LOFA-ADS) missile systems is under way. An additional $19.5 million is required to obtain hardware for engineering tests on the selected LOFAADS candidate.

The A-X aircraft enters full-scale development this year, so funding requirements increase by $64.3 million.

We will begin competitive prototype development of the Advanced Attack Helicopter in FY 74. This first full year of development will require an additional $29.2 million over the FY 73 funds.

An additional $16.1 million is required for several high-priority projects.

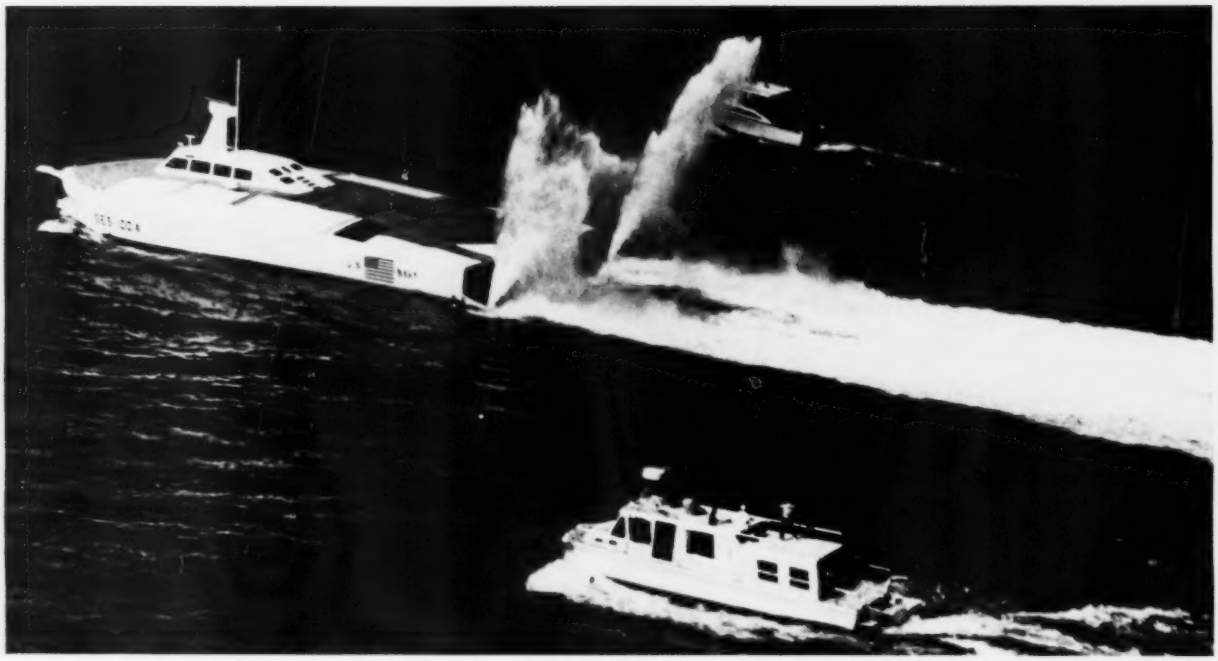
The first full year of advanced development for the Army's Tank System is FY 74, with competitive prototype development beginning in FY 73; this program requires an additional funding.

Ocean-Control

Programs that are all past their peak RDT&E funding years in this area are the S-3A ASW (antisubmarine-warfare) aircraft (−$33.6 million), the AN/BQQ-5 Submarine Sonar (−$11.8 million), Aegis (−$35.3 million), and the Standard surface-to-surface missile (−$13.0 million).

RDT&E funding of the Sea-Control Ship (SCS) program was completed after funding of $10 million in FY 73 provided for competitive contract design. Construction of the lead ship from the SCS account is anticipated in FY 75.

The Surface Effects Ship (SES) pro-



SKIMMER—One of several kinds of surface effects ship (left center of photo) undergoes tests to evaluate its potential to provide the Navy with an 80-knot capability.

(U.S. Navy Photo)

gram's funding will increase by $40.8 million as the 2,000-ton prototype begins advanced development in FY 74.

National Intelligence

A large portion of the increase in Defense RDT&E is for programs under the cognizance of Dr. Albert Hall, Assistant Secretary of Defense (Intelligence).

Global Communications

Dr. Eberhardt Rechtin, Assistant Secretary of Defense (Telecommunications), has cognizance over communications programs, for which the Defense RDT&E budget for FY 74 is increased by $50.2 million. Our communications planning stresses four prime objectives—reliability, survivability, security and cost effectiveness. We are continuing development of the Airborne Command Post and satellite communications for the Defense Communications System and the Navy. Also we are increasing support of TRI-TAC, the tri-Service system to provide trunk communications in a tactical theater; Sanguine, the hardened system for communications with submarines; and the satellite data system, which enhances the survivability of our communications with the Single, Integrated Operations Plan (SIOP) forces, particularly bombers.

Navigation Systems

Where a large production investment is anticipated (e.g., Army and Air Force tactical airborne Loran), an expanded RDT&E effort has been required to conduct price-limited prototyping. The intent is to invest slightly more effort during the development process to ensure economy in the production phase. For this purpose, an additional $5.5 million is requested.

We are requesting additional funds for near-term improvements and hardening of the currently operational Navy navigation satellite system, Transit, and to develop the next generation of highly accurate satellites for the Defense Navigation Satellite System (DNSS). In the DNSS program, we are establishing an all-Service effort to test and demonstrate satellite navigation technology and capabilities. Current plans call for a major satellite navigation experiment that will lead to a definition of the optimum system to meet all the Services' navigation requirements in the 1980s.

In January 1973, a Defense Navigation Planning Group (DNPG) was established. Its membership includes key managers from the OSD and Service offices most concerned with area navigation and related functions. Observers have been invited to represent interested civil agencies—the Federal Aviation Administration, NASA, the Maritime Administration, and the Office of Telecommunications Policy. The DNPG will serve as a focus of continuing management attention in area navigation planning.

Funding Priorities

Several important RDT&E programs have been necessarily slowed down or postponed by our desire to keep the budget request at a rock-bottom level. Making the final budget decisions is a difficult task, requiring a balance of the risk in not going forward at maximum pace, the impact of a delay in the status of technology, and legitimate competing demands for funding other programs.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
Subscription Price: $4.50 domestic per year; $1.25 additional for foreign mailing; 10 cents per single copy.
☆ U.S. GOVERNMENT PRINTING OFFICE 513/350/X-65